UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/824,719	04/15/2004	Peter J. Schubert	89190.130903/DP-30974-3	6710

7590 12/30/2008

Jimmy L. Funke, Esq.
Delphi Technologies, Inc.
Mail Code 480410202
P.O. Box 5052
Troy, MI 48007

EXAMINER	
CHUO, TONY SHENG HSIANG	
ART UNIT	**PAPER NUMBER**
1795	
MAIL DATE	**DELIVERY MODE**
12/30/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/824,719	SCHUBERT ET AL.	
	Examiner	Art Unit	
	Tony Chuo	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 September 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24 and 38-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24 and 38-40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Claims 1-24 and 38-40 are currently pending. Claims 25-37 are cancelled. The amended claims do overcome the previously stated 103 rejections. However, upon further consideration, claims 1-24 and 38-40 are rejected under the following new 112 and 103 rejections. This action is made FINAL as necessitated by the amendment.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 16 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 16 recites the limitation "said releasing means" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-5, 19-24, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Redmond (US 2004/0016769) in view of Winstel (US 4265720), and further in view of Northrup et al (US 5882496), and as evidenced by Woo et al (US 5926711).

The Redmond reference discloses a hydrogen storage and recovery system "100" comprising a cassette "110" (housing); an opening connected to the cassette for conducting hydrogen gas into and conducting hydrogen gas out of the housing; a hydrogen storing material "115" enclosed within the cassette; a heating system for releasing hydrogen from the hydrogen storing material from the cassette through the opening; and an information processing and control system that is used to control or regulate hydrogen generation that includes sensors that sense the operating conditions of the system and adjusts the conditions within the cassette such as increasing the amount of heat supplied to the cassette in order to achieve an elevated temperature in the cassette and an increased release of hydrogen gas (See paragraphs [0044],[0064], [0073],[0080]). Examiner's note: According to the specification of the present application, "The silicon activation energies, i.e., the adsorption and desorption energies of hydrogen on silicon, must also be controlled. This is accomplished through one or more techniques comprising ... temperature activation ...". In other words, by controlling the temperature of the hydrogen storing material, the silicon activation energy is also inherently controlled. Therefore, the control system and heating system taught by Redmond implicitly controls the activation energy of hydrogen by controlling the temperature of the hydrogen storing material. In addition, the heating system is an

equivalent structure for causing the chemisorbed hydrogen atoms to be liberated from the dangling bond sites to be released as hydrogen gas from the housing through the at least one passage.

However, Redmond does not expressly teach a hydrogen storage member comprising a mass of silicon, wherein the silicon is in a monocrystalline form or a polycrystalline form. The Winstel reference discloses a hydrogen storage material that is a silicon material that is in a finely crystalline form (See column 1, lines 40-47). Examiner's note: It is well known in the art that crystalline silicon can be formed in a monocrystalline form or polycrystalline form.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the disclosure of Winstel indicates that crystalline silicon is a suitable material for use as a hydrogen storage material. The selection of a known material based on its suitability for its intended use has generally been held to be *prima facie* obvious (MPEP §2144.07). As such, it would be obvious to use crystalline silicon.

However, Redmond as modified by Winstel does not expressly teach a porous silicon having interior and exterior surfaces, wherein at least the interior surfaces have dangling bond sites at which reversible chemisorption of hydrogen atoms occurs, wherein at least the interior surfaces of the porous silicon have dendritic spikes or etched pits, wherein at least interior surfaces are bare silicon surfaces at which the dangling bond sites are exposed, wherein the porous silicon has been treated by a process selected from the group consisting of crushing, milling, treatment with

hydrofluoric acid and methanol in the presence of electric current, treatment with potassium hydroxide, treatment with hydrazine, wet etching, dry etching, deposition of a noble metal such as palladium or platinum, conformal vapor deposition of silicon, and non-conformal vapor deposition of silicon, wherein the porous silicon is derived from molten silicon by crystallization, and wherein the porous silicon is derived from silicon waste obtained from a silicon process waste stream.

The Northrup reference discloses a porous silicon structure that is formed by electrochemically etching a crystalline silicon substrate or wafer "10" with a hydrogen fluoride solution (wet etching), wherein the porous silicon adsorbs gas and desorbs gas upon increase in temperature by a heater (See column 3, lines 61-64 and column 4, lines 50-52). Examiner's note: The process of etching the surface of the silicon layer inherently forms interior and exterior surfaces, wherein pores (etched pits) formed have interior surfaces that are bare silicon surfaces. It is also inherent that the porous silicon defines a layer within at least a first surface portion of the hydrogen storage member. In addition, as evidenced by Woo et al, the process of wet etching the surface of a silicon film with HF, cleans the surface of the silicon film to form a bare silicon surface such that hydrogen bonds to the surface of the silicon film in dangling bond type (See column 4, lines 20-28). Further, it is noted that claims 23 and 24 are being construed as product-by-process and that the product itself does not depend on the process of making it. Accordingly, in a product-by-process claim, the patentability of a product does not depend on its method of production. The claims are obvious as it has been held similar products claimed in product-by-process limitations are obvious (In re Brown

173 USPQ 685 and In re Fessman 180 USPQ 324, See MPEP 2113: Product-by-Process claims).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Redmond/Winstel hydrogen storage material to include a porous silicon having interior and exterior surfaces, wherein at least the interior surfaces have dangling bond sites at which reversible chemisorption of hydrogen atoms occurs, wherein at least the interior surfaces of the porous silicon have dendritic spikes or etched pits, wherein at least interior surfaces are bare silicon surfaces at which the dangling bond sites are exposed, wherein the porous silicon has been treated by a process such as wet etching in order to utilize a high surface area porous silicon structure that significantly augments the adsorption and desorption of gases (See Abstract).

7. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Redmond (US 2004/0016769) in view of Winstel (US 4265720) and Northrup et al (US 5882496) and as evidenced by Woo et al (US 5926711) as applied to claims 1 and 5 above.

However, Redmond as modified by Winstel and Northrup et al does not expressly teach a percent void volume of the surface layer that is about 50%.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Winstel/Northrup porous silicon structures to include a percent void volume of the surface layer that is about 50% because it has been held that the discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. *In re Boesch*, 205 USPQ 215

(CCPA 1980). The percent void volume is a result effective variable of increasing the surface area of the porous silicon structure. In addition, there is no evidence of the criticality of the percent void volume.

8. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Redmond (US 2004/0016769) in view of Winstel (US 4265720) and Northrup et al (US 5882496) and as evidenced by Woo et al (US 5926711) as applied to claims 1 and 5 above, and further in view of Wagner et al (US 5196377).

However, Redmond as modified by Winstel and Northrup et al does not expressly teach electronic integrated circuits on a second surface portion of the hydrogen storage member. The Wagner reference discloses integrated circuits that are placed inside cavities of a silicon wafer "10" (See column 11, lines 12-16).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Winstel/Northrup porous silicon structures to include electronic integrated circuits on a second surface portion of the hydrogen storage member in order to utilize well known integrated circuit processing techniques to provide a silicon water-based integrated circuit carrier offering high density packaging with high yield processes. In addition, one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded nothing more than predictable results to one of ordinary skill in the art at the time of the invention.

9. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Winstel (US 4265720) in view of Kornilovich (US 7135057), and further in view of Northrup et al (US 5882496), and as evidenced by Woo et al (US 5926711).

The Winstel reference discloses a system for storing and retrieving hydrogen comprising: a housing "4"; a passage connected to the housing for conducting hydrogen gas into and conducting hydrogen gas out of the housing; a hydrogen storage member "5" enclosed within the housing that is a silicon material in a finely crystalline form; an operative valve control means "6"; and implicitly a heating means for discharging hydrogen gas from the housing through the passage (See column 2, lines 63-67, column 3, lines 40-48, and Figure 2). Examiner's note: The valve "6" and heating means disclosed by Winstel are construed as an equivalent structure for liberating chemisorbed hydrogen atoms from the dangling bond sites and releasing the liberated hydrogen atoms as hydrogen gas.

However, Winstel does not expressly teach a hydrogen storage member comprising a porous mesh of silicon columns, wherein the silicon columns are extruded through at least one aperture that is an integral multiple of the lattice spacing of silicon such that the silicon columns have a minimum energy configuration suitable for forming a crystal. The Kornilovich reference teaches a hydrogen storage medium that is made of a large pile of silicon nanowires that are in the shape of a column such that the medium has porosity (See column 3, lines 27-31).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Winstel system for storing and retrieving

hydrogen to include a hydrogen storage member comprising a porous mesh of silicon columns, wherein the silicon columns are extruded through at least one aperture that is an integral multiple of the lattice spacing of silicon such that the silicon columns have a minimum energy configuration suitable for forming a crystal in order to improve the storage efficiency of the hydrogen storage medium and to allow fast diffusion of gas molecules such as hydrogen.

However, Winstel as modified by Kornilovich does not expressly teach a hydrogen storage member comprising a silicon material having silicon surfaces with dangling bond sites at which reversible chemisorption of hydrogen atoms occurs. The Northrup reference discloses a porous silicon structure that is formed by electrochemically etching a crystalline silicon substrate or wafer "10" with a hydrogen fluoride solution (See column 3, lines 61-64 and column 4, lines 50-52). Examiner's note: As evidenced by Woo et al, the process of wet etching the surface of a silicon film with HF, cleans the surface of the silicon film to form a bare silicon surface such that hydrogen bonds to the surface of the silicon film in dangling bond type (See column 2 line 65 to column 3 line 2).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Winstel/Kornilovich system for storing and retrieving hydrogen to include a hydrogen storage member comprising a silicon having surfaces with dangling bond sites at which reversible chemisorption of hydrogen atoms occurs in order to utilize a high surface area porous silicon structure that significantly augments the adsorption and desorption of gases (See Abstract).

10. Claims 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Winstel (US 4265720) in view of Kornilovich (US 7135057) and Northrup et al (US 5882496) and as evidenced by Woo et al (US 5926711) as applied to claim 8 above, and further in view of Kim (US 2002/0158284).

However, Winstel as modified by Kornilovich and Northrup et al does not expressly teach silicon columns that are formed by extrusion of molten silicon to have surfaces on the (111) plane. The Kim reference discloses that typically silicon wafers have a (100) orientation on the top surface and the exposed silicon near the trenches has a (111) orientation, wherein the (111) orientation has a larger number of dangling bonds (See paragraph [0006]). Examiner's note: It is noted that claims 10 and 11 are being construed as product-by-process and that the product itself does not depend on the process of making it. Accordingly, in a product-by-process claim, the patentability of a product does not depend on its method of production. The claims are obvious as it has been held similar products claimed in product-by-process limitations are obvious (In re Brown 173 USPQ 685 and In re Fessman 180 USPQ 324, See MPEP 2113: Product-by-Process claims).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Winstel/Kornilovich/Northrup system for storing and retrieving hydrogen to include silicon columns that are formed by extrusion of molten silicon to have surfaces on the (111) plane in order to utilize a silicon material orientation that has a greater number of dangling bonds, thereby increasing the storage efficiency of the hydrogen storage material.

11. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Winstel (US 4265720) in view of Kornilovich (US 7135057) and Northrup et al (US 5882496) and as evidenced by Woo et al (US 5926711) as applied to claim 8 above, and further in view of Majumdar et al (US 2002/0172820). In addition, Kornilovich discloses nanowires (columns) that have a diameter of less than about one micrometer and may include cylindrical structures (See column 1, lines 56-60).

However, Winstel as modified by Kornilovich and Northrup does not expressly teach silicon columns that have diameters of about 1 nm. The Majumdar reference discloses methods of forming nanowire structures with a diameter of approximately 5 nm to approximately 50 nm (See paragraph [0068]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Winstel/Kornilovich/Northrup system for storing and retrieving hydrogen to include silicon columns that have diameters of about 1 nm in order to improve the storage efficiency of the gas storage medium by increasing the surface area of the silicon columns. In addition, even if the range of the prior art and claimed range do not overlap, obviousness may still exist if the ranges are close enough that one would not expect a difference in properties (*In re Woodruff* 16 USPQ 2d 1934 (Fed. Cir. 1990)).

12. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Winstel (US 4265720) in view of Kornilovich (US 7135057) and Northrup et al (US 5882496) and Ciszek et al (US 4594229) as applied to claim 10 above, and further in view of Anthony et al (US 6040230).

However, Winstel as modified by Kornilovich, Northrup et al, and Ciszek et al does not expressly teach silicon columns that have roughened surface. The Anthony reference discloses polysilicon structures "306" that etched with oxygen in order to roughen the surface (See column 6, lines 6-10).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Winstel/Kornilovich/Northrup/Ciszek system for storing and retrieving hydrogen to include silicon columns that have roughened surface in order to enhance the surface area of the silicon columns and further improve the storage efficiency.

13. Claims 15 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Winstel (US 4265720) in view of Kornilovich (US 7135057) and Northrup et al (US 5882496) applied to claim 8 above, and further in view of Redmond (US 2004/ 0016769).

However, Winstel as modified by Kornilovich and Northrup et al does not expressly teach a control unit comprising means for receiving inputs indicative of operating parameters of the system and means for issuing outputs that control the liberating means, wherein the control unit comprises means for controlling the silicon activation energy of hydrogen on the porous mesh of crystalline silicon columns of the hydrogen storage member. The Redmond reference discloses a hydrogen storage and recovery system "100" comprising an information processing and control system that is used to control or regulate hydrogen generation that includes sensors that sense the operating conditions of the system and adjusts the conditions within the cassette such

as increasing the amount of heat supplied to the cassette in order to achieve an elevated temperature in the cassette and an increased release of hydrogen gas (See paragraphs [0044],[0064], [0073],[0080]). Examiner's note: According to the specification of the present application, "The silicon activation energies, i.e., the adsorption and desorption energies of hydrogen on silicon, must also be controlled. This is accomplished through one or more techniques comprising ... temperature activation ...". In other words, by controlling the temperature of the hydrogen storing material, the silicon activation energy is also inherently controlled. Therefore, the control system and heating system taught by Redmond implicitly controls the activation energy of hydrogen by controlling the temperature of the hydrogen storing material.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Winstel/Kornilovich/Northrup system for storing and retrieving hydrogen to include a control unit comprising means for receiving inputs indicative of operating parameters of the system and means for issuing outputs that control the liberating means, wherein the control unit comprises means for controlling the silicon activation energy of hydrogen on the porous mesh of crystalline silicon columns of the hydrogen storage member in order to utilize a control system that more accurately and efficiently supplies hydrogen to a hydrogen utilizing system.

14. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Winstel (US 4265720) in view of Kornilovich (US 7135057), Northrup et al (US 5882496), and Redmond (US 2004/ 0016769) as applied to claim 15 above, and further in view of Yamazaki et al (US 2003/0170939).

However, Winstel as modified by Kornilovich and Northrup et al does not expressly teach a releasing means that is selected from the group consisting of light sources, current sources, voltage sources, and combinations thereof. The Yamazaki reference teaching the concept of forming crystalline silicon by sputtering a single crystalline silicon target in a mixture of hydrogen and argon, wherein the silicon atoms are coupled with hydrogen atoms at their external surfaces in order to terminate their dangling bonds, and wherein the Si-H bonds reacts with other Si-H bonds to convert to Si-Si bonds by radiation of a beam emitted from a light source (See paragraph [0049]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the Winstel/Kornilovich/Northrup/Redmond method of releasing hydrogen with a releasing means that is a light source because the substitution of one known method for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

15. Claims 17, 18, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Redmond (US 2004/0016769) in view of Winstel (US 4265720) and Northrup et al (US 5882496), and as evidenced by Woo et al (US 5926711) as applied to claim 1 above, and further in view of Yamazaki et al (US 2003/0170939).

However, Redmond as modified by Winstel and Northrup et al does not expressly teach a releasing means that comprises a light emitting diode; or a releasing means that comprises a light source that emits photon energy at a wavelength of about 660 nanometers and the photon energy through the porous silicon and onto the interior surfaces of the porous silicon to liberate the chemisorbed hydrogen atoms from the

dangling bond sites on the interior surfaces. The Yamazaki reference teaching the concept of forming crystalline silicon by sputtering a single crystalline silicon target in a mixture of hydrogen and argon, wherein the silicon atoms are coupled with hydrogen atoms at their external surfaces in order to terminate their dangling bonds, and wherein the Si-H bonds reacts with other Si-H bonds to convert to Si-Si bonds by radiation of a beam emitted from a light source (See paragraph [0049]). In other words, hydrogen atoms are liberated from the silicon material by a releasing means that comprises a light source that emits photon energy. In addition, it is well known in the art that light sources such as light-emitting diodes are commonly used. Further, one skilled in the art would know that a light source that emits photon energy at a wavelength of about 660 nanometers would be necessary to liberate chemisorbed hydrogen atoms from a silicon material.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the Redmond/Winstel/Northrup method of releasing hydrogen with a releasing means that is a light source, wherein the releasing means comprises a light emitting diode because the substitution of one known method for another would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

Response to Arguments

16. Applicant's arguments filed 9/30/08 have been fully considered but they are not persuasive.

The applicant argues that in contrast, electrochemical etches under certain operating conditions, such as those taught in Applicants' specification (for example, see [0049]), are capable of forming interior surfaces in a silicon surface, and prior art such as Northrup and Woo that do not expressly disclose an etching process that forms interior surfaces and pits within a silicon substrate cannot be arbitrarily assumed to do so. Firstly, the applicant has not provided any factual evidence to show that the electrochemical etch process taught by Northrup et al does not inherently form interior surfaces in a silicon surface. Secondly, the Northrup reference expressly teaches an electrochemical etch conditions that are used to form 10 nm diameter pore material, wherein the pores can be construed as pits with interior surfaces.

The applicant further argues that Kornilovich consistently and repeatedly cites three features that are significant and contrary to Applicants' invention recited in claim 8. In response, the examiner would like to point out that the Kornilovich is relied upon for teaching the concept of forming a plurality of silicon nanowires which are in the shape of silicon columns with nanosized diameters, wherein silicon nanowires have increased surface area that improves the storage efficiency of hydrogen. Therefore, the Kornilovich does not need to teach all of the remaining features of claim 8.

The applicant further argues that since the motivation for increased surface area is found only in applicants' disclosure, applicants believe Anthony is an improper reference. The examiner disagrees because the motivation to combine the reference is found in the knowledge that is generally available to one of ordinary skill in the art since it is well known in the art that a roughened surface has increased surface area.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571)272-0717. The examiner can normally be reached on M-F, 9:00AM to 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TC

/Jonathan Crepeau/
Primary Examiner, Art Unit 1795